

IN THE CLAIMS

The following listing reflects the current version of all claims, and replaces all earlier versions and listings.

1. (Currently Amended) An information processing device for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said device comprising:

image-taking means for taking images in real space in order to display the ~~said~~ virtual object in a superimposed manner on real space;

synthesizing means for synthesizing a virtual object with the ~~said~~ taken image;

operating means for controlling ~~operating~~ the position and orientation of the ~~said~~ virtual object; and

aiding means for obtaining a three-dimensional position of real space from external instructions, and obtaining a constraining shape for aiding in control operations for the position and orientation of the ~~said~~ virtual object;

wherein the position and orientation of the ~~said~~ virtual object are controlled ~~operated~~ by instructions from said operating means, based on constraint conditions based on the constraining shape obtained by said aiding means.

2. (Currently Amended) An information processing device according to Claim 1, wherein the ~~said~~ constraining shape is a shape in which a three-dimensional

position in real space obtained by external instructions is configured of an apex or a component plane.

3. (Currently Amended) An information processing device according to Claim 1, wherein the following control operations of the position and orientation of the said virtual object can be made using said operating means:

translation transformation following the said constraining shape; and
rotation transformation on an axis which is a normal vector at a plane where the said constraining shape and the said virtual object come into contact.

4. (Currently Amended) An information processing device according to Claim 1, wherein the said virtual object is subjected to three-dimensional transformation by control operations of said operating means, such that the position of said operating means on a two-dimensional screen and the position of the said virtual object on a two-dimensional screen are synchronized.

5. (Currently Amended) An information processing method for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said method comprising:

a measurement step obtaining external parameters indicating the position and orientation of image-taking means in order to fixedly display said the virtual object in real space;

an operating step for ~~controlling~~ ~~operating~~ the position and orientation of ~~the said~~ virtual object;

an aiding step for adding ~~constraint~~ constraints to the control operations of ~~an~~ operating means so as to aid the control operations on the ~~of said~~ virtual object;

an input step for inputting a constraining shape to be a reference for generating ~~said~~ ~~constraining~~ the constraints;

a synthesizing step for synthesizing pictures of real space obtained by image-taking means, and pictures of ~~the said~~ virtual object estimated from the position and orientation of ~~the said~~ image-taking means;

wherein the position and orientation of ~~the said~~ virtual object in said operating step is transformed in said aiding step with ~~the said~~ constraining shape plane as a reference, thereby aiding control operations.

6. (Original) An information processing method according to Claim 5, wherein said input step obtains three-dimensional position in real space from external instructions.

7. (Currently Amended) An information processing method according to Claim 6, wherein a virtual image indicating ~~the said~~ input virtual shape is synthesized with an image of ~~the said~~ real space and pictures of ~~the said~~ virtual object.

8. (Original) A computer program, wherein the information processing method according to Claim 5 is executed by a computer device.

9. (Original) A computer-readable recording medium, storing the computer program according to Claim 8.

10. (Currently Amended) An information processing method for ~~controlling~~ ~~operating~~ the position and orientation of a virtual object in compounded real space obtained by synthesizing pictures of real space and a virtual object, said method comprising:

a step for obtaining a constraining shape serving as constraint conditions, from a plurality of positions in real space instructed by a user using an operating unit capable of obtaining three-dimensional information;

a step for changing the position and orientation of ~~the said~~ virtual object according to instructions from the user, with ~~the said~~ obtained constraining shape as constraint conditions; and

a step for synthesizing an image of virtual object generated according to ~~the said~~ changed position and orientation, with pictures of real space.

11. (Currently Amended) An information processing method according to Claim 10, wherein a virtual image indicating ~~the said~~ input virtual shape is synthesized with ~~the said~~ pictures of real space.

12. (Currently Amended) An information processing method according to Claim 10, wherein the said constraining shape is a plane.

13. (Currently Amended) An information processing method according to Claim 10, wherein change of the position and orientation of the said virtual object is carried out by changing the position and orientation of the said operating unit.

14. (Original) A computer program, wherein the information processing method according to Claim 10 is executed by a computer device.

15. (Original) A computer-readable recording medium, storing the computer program according to Claim 14.

16. (New) An information processing device for aiding control operations relating to position and orientation of a virtual object positioned in three-dimensional space, said device comprising:

an image-taking unit for taking images in real space in order to display the virtual object in a superimposed manner on real space;

a synthesizing unit for synthesizing a virtual object with the taken image;

an operating unit for controlling the position and orientation of the virtual object; and

an input unit for obtaining a three-dimensional position of real space from external instructions, and obtaining a constraining shape for aiding in controlling the position and orientation of the virtual object;

wherein the position and orientation of the virtual object are controlled by instructions from said operating unit, based on constraint conditions based on the constraining shape obtained by said input unit.

17. (New) An information processing device according to Claim 16, wherein the constraining shape is a shape in which a three-dimensional position in real space obtained by external instructions is configured of an apex or a component plane.

18. (New) An information processing device according to Claim 16, wherein the following control operations of the position and orientation of the virtual object can be made using said operating unit:

translation transformation following the constraining shape; and

rotation transformation on an axis which is a normal vector at a plane where the constraining shape and the virtual object come into contact.

19. (New) An information processing device according to Claim 1, wherein the virtual object is subjected to three-dimensional transformation by control operations of said operating unit, such that the position of said operating unit on a two-